



Understanding the Service Availability for Non-Communicable Disease Prevention and Control at Public Primary Care Centers in Northern Vietnam

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Citation	Duong, David B. 2015. Understanding the Service Availability for Non-Communicable Disease Prevention and Control at Public Primary Care Centers in Northern Vietnam. Doctoral dissertation, Harvard Medical School.
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Abstract

Background

Non-Communicable diseases (NCDs) are currently responsible for over 60% of global deaths, 80% of which are in low-and-middle-income countries. In Vietnam, a low-middle income country, between 1986 and 2008, the proportion of all hospital admissions attributable to NCDs increased from 39% to 69%, and mortality attributed to NCDs rose from 42% to 63%. There is strong evidence that a health system focused on primary care can deliver better health outcomes at a lower cost. There exist a robust primary care network of commune health centers in Vietnam, which have the potential to deliver high quality chronic disease care. This study proposes to (1) to analyze the current political framework for NCD prevention and control in Vietnam, specifically how it supports NCD service availability at the commune health level, and (2) to understand the current situation of NCD service availability at the commune health centers (CHCs) in three geographical regions in northern Vietnam, in order to inform the government of Vietnam (GOVN) in setting realistic national targets for NCDs in 2015, aligning with the UN Political Declaration of NCD Prevention and Control, of which Vietnam is a signatory.

Methodology

This mixed methods study involved a critical review of published and unpublished literature, and GOVN documents to understand the current situation of NCDs service delivery. Additionally, from December 2013 until April 2014, 89 CHCs were surveyed in three provinces in northern Vietnam on NCD service availability using the World Health Organization Service Availability and Readiness Assessment (SARA) tool, adapted for the Vietnam context.

Results

471 published papers along with seven key government documents were found regarding the NCD situation and service delivery in Vietnam. Service availability around NCDs varied by both disease type and location. 53% of CHCs offer diabetes services, 64% offer services hypertension, 39% offer services for chronic lung diseases, 22% offer services for cancer, and 96% offer mental health services. Of these, only services for diabetes, hypertension and chronic lung diseases were statistically different ($p < .05$) between the three geographical regions.

Conclusions

There is strong government support for NCD prevention and control at the highest levels, however, implementation of NCD programs have not resulted in substantial population health gains. In the current situation, Vietnam's network of CHCs do not have adequate NCD service availability for either prevention or control, which can be explained by a vertical, disease specific program implementation model, a lack of medications, non-standard payment mechanisms, and low patient volume visiting the CHCs. However, the current system has many strengths that can be utilized to build a robust response to curb the growing NCD epidemic.

Keywords

Non-Communicable Diseases, Primary Care, Commune Health Centers, Vietnam, Service Availability, Service Readiness

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List of Acronyms

CHC	Commune Health Center
CLD	Chronic Lung Diseases
COPD	Chronic Obstructive Lung Diseases
CPC	Center for Primary Care
CV	Cardiovascular Diseases
DM	Diabetes Mellitus (Type 2)
DoH	Department of Health
GoVN	Government of Vietnam
GSO	General Statistics Office
HMS	Harvard Medical School
HMU	Hanoi Medical University
HSPI	Health Strategy and Policy Institute
IRB	Institutional Review Board
LMIC	Low-middle Income Country
MoH	Ministry of Health
NCDs	Non-Communicable Diseases
NCRDP	National Chronic Respiratory Disease Project
NCCP	National Cancer Control Program
NDP	National Diabetes Program
NHP	National Hypertension Program
NIN	National Institute of Nutrition
NMHP	National Mental Health Program
PHC	Primary Health Care
SARA	Service Availability and Readiness Assessment
VINACOSH	Vietnam Steering Committee on Smoking and Health
WB	World Bank
WHO	World Health Organization
PEN	Package of Essential Noncommunicable Disease Interventions

Introduction

Worldwide, non-communicable diseases (NCDs) are responsible for over 38 million deaths each year; of these deaths, 28 million occur in low-and-middle income countries (WHO, 2015). Vietnam is a low-middle income country in Southeast Asia (World Bank, 2014) that has experienced a massive shift in epidemiological patterns from communicable to non-communicable diseases (NCDs) (Son, 2012). According to 2009 statistics published by the Vietnamese Ministry of Health, from 1986 to 2008, the proportion of all hospital admissions attributable to NCDs increased from 39% to 69%, and chronic diseases deaths rose from 42% to 63% (Ministry of Health, 2009). This dramatic rise in NCDs has lead the Government of Vietnam (GOVN) to respond with a National Plan for NCD Prevention and Control, initiated in 2002. An independent review of the Plan's implementation from 2002-2010 at the national level has concluded that the plan has not lead to major population health gains, but rather, the NCD epidemic is still rapidly increasing (Harper, 2011). This study has two major aims: (1) to analyze the current political framework for NCD prevention and control in Vietnam, specifically how it supports NCD services at the commune health level, and (2) to understand the current situation of NCD service availability at the CHCs.

Vietnam needs to develop national targets for NCD Prevention and Control in 2015 as stipulated by the UN Political Declaration on NCDs, of which Vietnam is a signatory. Information on the current state of NCD Prevention and Control at the CHC level will help Vietnam set realistic national targets, and develop appropriate strategies to meet those targets.

Non-Communicable Diseases: The Global Context

The WHO expanded definition of NCDs includes five major groups of diseases: cardiovascular diseases, diabetes, chronic respiratory diseases, cancer, and mental illness. People across the spectrum of life, from children to the elderly, are vulnerable to the four major risk factors that contribute to NCDs: unhealthy diets, physical inactivity, exposure to tobacco smoke and the effects of the harmful use of alcohol (WHO, 2015). Worldwide, the exponential rise in NCDs is the result of economic and material development, leading

to an ageing population, rapid urbanization, and the globalization of unhealthy life-styles. Every country feels the societal, economic and personal effects of NCDs, but NCDs disproportionately impact low-and-middle income countries, straining their already weak health systems (WHO, 2015).

The 2011 World Bank report, “The Growing Danger of Non-Communicable Diseases, Acting Now to Reverse Course,” emphasizes the overwhelming impacts of NCDs on national economies because NCDs affect adults in their most productive years. The increase in NCDs can reduce labor supply and outputs, yield lower returns on human capital investments, reduce domestic consumption and lower tax revenues, and substantially increase public health and social welfare expenditures (World Bank, 2011). The WHO estimates, between 2011–2025, that the cumulative economic losses due to NCDs under a “business as usual” scenario in low- and middle-income countries can reach an estimated at \$7 trillion (WHO, 2014). The WHO expects this global cost to far outweigh the annual \$11.2 billion cost of implementing a set of high-impact interventions to reduce the NCD burden (WHO, 2014).

The Global Response to NCDs

Recognizing the alarming trend of the rising NCDs epidemic, coupled with the economic and development impacts, Ministers of Health convened the first global ministerial conference on healthy lifestyles and NCD control in Moscow, leading to the Moscow Declaration in May 2011, emphasizing the need for multisectoral approaches at the international, national government and ministerial level in collaborating to prevent and control NCDs, recognizing not only biomedical factors but also behavioral, environmental, societal and economic factors in the rise of NCDs. The Moscow Declaration was followed by the a high-level meeting by Heads of State and Government in September 2011 in New York, committing themselves in the UN Political Declaration to establish and strengthen, by 2013, multi-sectoral policies and plans for the prevention and control of NCDs, and, in 2015, to consider the development of international and national targets and indicators.

In order to realize these commitments, the WHO created the Global Action Plan for the Prevention and Control of NCDs 2013-2020 in May 2013, which 190 countries endorsed. This Action Plan sets out nine voluntary NCD targets to be reached by 2025, including a 25% relative reduction in premature mortality from NCDs (figure 1). The plan provides a roadmap and array of policy options that can be implemented by WHO member states. The Action Plan also outlines a global monitoring framework on NCDs to start tracking implementation of the Action Plan by 2015 against a baseline in 2010. From the Action Plan, governments are urged to (i) set national NCD targets for 2025 based on national circumstances; (ii) develop multisectoral national NCD plans to reduce exposure to risk factors and enable health systems to respond in order to reach these national targets in 2025; and (iii) measure results (WHO, 2012).

In July 2014, the United Nations General Assembly conducted a review to assess progress in implementing the 2011 Political Declaration on NCDs, which revealed that there was insufficient and highly uneven implementation of the roadmap by member states set out by the Global Action Plan. The main task identified for countries is to set up national NCD targets consistent with global targets by developing national NCD multi-sectoral plans by the end of 2015, and start to implement those plans in 2016. At the end of 2014, the WHO published its second Global NCD Status Report to track worldwide progress in the prevention and control of NCDs. A key message from the report addresses the need to strengthen primary care. The report emphasizes that investments in health systems, specifically primary care, are necessary to improve NCD health outcomes. In the current environment, there are fundamental gaps at the primary care level to delivering equitable health care to people suffering from NCDs. The report reviewed eight low-to-middle income countries' capacities, and identified the major factors as obstacles in delivering NCD care include health financing, service delivery, access to basic technologies and medicines, medical information systems, and the health workforce (WHO, 2014).

As stated above, WHO has developed a global strategy and action plan for the prevention and control of NCDs. This dominant approach covers the development of national policy

frameworks, gives guidance on the establishment of targeted programs and population-based interventions, and discusses the need for close monitoring and evaluation at different levels of health care, but does not include a comprehensive strategy for action towards improving the primary care response to NCDs (Maher, 2009). Although the WHO has published an evidence-based Package of Essential Noncommunicable (PEN) Disease Intervention for Primary Care in Low Resourced Settings which includes a list of essential, cost-effective interventions, medications, equipment and guidelines, the WHO-PEN does not adequately address how to implement and integrate WHO-PEN within a health system at primary care delivery sites, and the integration of WHO-PEN within the overall Global Action Plan framework at the national and international level.

Primary Care and NCDs

There is strong evidence that primary care can deliver better health outcomes at lower cost (Starfield, 2005; Lawn, 2008; WHO, 2008, 2009). People with NCDs or those who have risk factors for developing NCDs require long-term care that is proactive, patient centered, community based and sustainable (WHO, 2008, 2009). Such care is best delivered through health systems based on primary care (Starfield, 2005; De Maeseneer, 2008). Key features of a health system led by primary care include: (i) a person focus across the lifespan rather than a disease focus; (ii) accessibility with no out-of-pocket payments; (iii) distribution of resources according to population needs rather than demand; and (iv) availability of a broad range of services including preventive services and coordination between different levels in the health system (WHO, 2008). Primary care can serve as a health service entry point for many people with NCDs and therefore has the potential to serve a key role in the delivery of prevention and care interventions. The primary care response to common NCDs is often unstructured and inadequate (Maher, 2009; Peck, 2014). Data from LMICs to demonstrate the burden of NCDs in primary care facilities and the readiness of these facilities to handle the rising epidemic of NCDs are not widely available (Peck, 2014; Minh, 2014; Islam, 2014; McKee, 2014; Kengee, 2014), despite the high-level attention given to NCDs since the Political Declaration in 2011. Therefore, it is difficult for governments and international organizations to plan appropriate responses to assess the quality and impact of the

services provided (WHO, 2014; Peck, 2014). The absence of necessary data perpetuates an inadequate strategy and response at the primary care level, which may contribute to the findings of the WHO Global NCD Status Report 2014, which states, “fundamental gaps at the primary care level [in] delivering [NCD] care to people.”

There is no single pathway for countries to reach the nine voluntary global targets, and that each country needs to define its own path given its current cultural, socio-economic and current health system. However, there is agreement that in order to set national targets, countries need to start with assessing their current capacity in the readiness and availability of their health system to deliver NCD services (Medis, 2010; Peck, 2014; WHO, 2014).

Non-Communicable Disease: The Vietnam Context

Vietnam is an “S” shaped country located in Southeast Asia, bordered by China in the north, to the west by Lao and Cambodia, and to the east by the East Sea. Stretching 1,650km from north to south, the country has 91.7 million people (WHO, 2013). Vietnam has a long history of conflict, first with the Chinese in the 17th and early 18th centuries, followed by the French at the beginning of the 20th century, and then a civil war between the communist controlled Democratic Republic of Vietnam (North Vietnam) and the US backed Republic of Vietnam (South Vietnam), ending in 1975. The country is currently united under the sole authoritarian leadership of the Communist Party of Vietnam. Vietnam formerly had a command economy controlled by the State. In 1986, a series of economic reforms, or *Doi Moi*, were initiated, transitioning Vietnam to a “market economy with socialist orientation.” The transition has been characterized as privatization, spontaneous decentralization and deregulation. This transition of economic strategy resulted in remarkable economic gains, transforming Vietnam from one of the poorest countries in the world to a low-middle income country (LMIC) with a per capita income estimated at US \$1,910 (\$5,030 PPP) in 2014 (World Bank, 2014). The average life expectancy of the Vietnamese people also increased to 71 years for men, and 80 for women (WHO, 2013).

Aside from the economic transition, Vietnam is categorized as “undergoing an epidemiological transition,” in which overall morbidity and mortality patterns shift away from communicable diseases to NCDs (Son, 2012). The word “transition” gives a false sense of reassurance that there is still time to address the problem. However, epidemiological data indicate otherwise. According to 2009 statistics published by the Vietnamese Ministry of Health, from 1986 to 2008, the proportion of all hospital admissions attributable to NCDs increased from 39% to 69%, and chronic diseases deaths rose from 42% to 63% (Ministry of Health, 2009). The probability of dying between the ages of 30 and 70 among the four NCDs (diabetes, cancer, cardiovascular diseases and chronic lung diseases) is 17% (WHO, 2014). Cerebrovascular disease is the highest ranking cause of number of life years lost (YLLs) due to premature deaths in Vietnam, at 11.2% in 2010, compared to 6.6% in 1990 when the number one cause of YYLs was due to lower respiratory infections (WHO, 2014). The top five conditions contributing to years lived with disability (YLDs) are all chronic diseases: low back pain, major depressive disorder, chronic obstructive pulmonary disease, neck pain, and migraine. The three risk factors that account for the most disease burden in Vietnam are dietary, tobacco and high blood pressure (Figure 2) (WHO, 2014).

The risk factors for NCDs are also common in Vietnam. The prevalence of cigarette smoking in men and women was 56.1% and 1.8%, respectively in 2003 (General Statistics Office, 2003). Through tobacco prevention programs, this number has decreased to 46% in males, but has risen slight to 2% in females in 2011 (WHO, 2014). In 2004, WHO data showed that the prevalence rates of heavy and hazardous alcohol drinking among men and women were 5.7% and 0.6%, respectively, and this number has risen to 12.1% and .2% in 2008 (WHO, 2014). In 2008, the obesity rate was 1.7% of the total population. However, among subsets of the population, the rates of obesity are much higher. In 2005, the prevalence of on overweight and obesity among the 44-54 age group the rate was 43% in urban and 17% in rural areas (Khan, 2008). A recent study by Nguyen et al in 2010 showed that the prevalence of overweight and obesity among adolescents aged 11-14 years in HCMC were 17.8% and 3.2%. The rate of overweight and obesity is increasing in both urban and rural populations, across age groups (Khan,

2008; Hong, 2007; Trang, 2012). The data are minimal for the prevalence of physical inactivity. In a multi-country study of the prevalence of physical inactivity among the rural population, rates in Vietnam ranged from 13% to 58% (Ng, 2009). A study by Trinh et al in 2008 in Ho Chi Minh City found that only 56.2% of people aged 25–64 years achieved the minimum recommendation of 'doing 30 minutes moderate-intensity physical activity for at least 5 days per week'.

The estimated economic loss caused by NCDs for Vietnam in 2005 was about US\$20 million, or 0.33% of annual national GDP. This number is projected to double by 2015 if no intervention is made, with accumulated economic losses in GDP between 2006 and 2015 of as much as US \$270 million (Abegunde, 2007).

Organization of Health System in Vietnam

Please see figure 3 for a graphical representation of the Vietnamese health system. The Vietnam health care system can be divided into curative care and preventative care. The curative public health sector is composed of 11,400 commune health centers (CHCs), 900 hospitals (730 general hospitals and 103 specialized hospitals), 860 general clinics, and 94 specialized clinics (WHO, 2012; Ministry of Health, 2012). The entry-point of care is organized at the CHC, each serving a population of roughly 5,000 people, located in both rural and urban areas. The district health center is the next level, and serves as the first level with in-patient hospital services. The provincial hospital and specialty clinics serve as referral centers for the district level. From the provincial level, national level hospitals serve as the final referral centers. Existing in parallel with the public system is a private system that emerged after *Doi Moi* with private clinics in the community, often staffed by public employees after official working hours, and private hospitals in the metropolitan areas. Since *Doi Moi*, the number of private clinics and hospitals has been on a steady increase. Currently, 4% of registered hospital beds belong to the private sector, and 11% of all hospitals in Vietnam are registered as private hospitals (Cheng, 2014).

The preventative care system is separate from the curative system at the national and provincial level, while some districts either integrate or separate the preventative and

curative sectors. The preventative care system, although within the MOH, works directly with the various national institutes (i.e. National Institute of Hygiene and Epidemiology, National Institute of Nutrition, etc.). Through predominately vertical programming, these national institutes work directly with provincial department of health's preventative medicine arm, who in turn gives direction to the district department of preventative medicine to implement the programs at the community level through the CHCs. In many districts, if the prevention and curative systems are not integrated at the district level, the CHC is the only level that integrates the prevention and curative systems.

CHCs are the basic unit of primary health care and serve as a foundation for the national health care system. CHCs are responsible for implementing the NTPs. NTPs are "owned" by different national institutes or hospitals with funding from central and provincial governments that are often targeted towards particular diseases and/or interventions such as the National Immunization Program, the National Malnutrition Prevention Program, and the National Hypertension Control Program. CHCs serve as implementers of these programs at the community level, with technical assistance from the district, provincial and national levels, and funding disseminated from a central source. CHCs also provide examination and treatment for common diseases, health counseling, managing and distributing common medications and medications in the NTPs, referrals for patients with serious illnesses, prenatal and postnatal care and common spontaneous vaginal deliveries. CHCs also can admit short-term patients for observation and delivery of intravenous fluids. CHCs often vary from one geographical area to another, and for this reason, in 2000, the MOH released MOH Benchmark Standards for CHC readiness, comprised of 90 indicators of equipment availability, facility standards, staffing and other criteria. The latest version of these standards was revised Decision 3447/QĐ-BYT dated 22/9/2011.

With the introduction of *Doi Moi* reforms, the health care sector was also transformed. Formerly health care was free at all levels, user fees were introduced at the commune, district health centers, provincial and national hospitals; The private medical sector was legalized; and, the pharmaceutical industry was placed outside of State control, liberalizing the transaction of pharmaceutical products (Guldner, 1995). This resulted in

shifting attitudes on health seeking behaviors, including the migration of health professionals to the more lucrative private sector, self-medication and self-treatment by patients, and higher utilization of medical services in the private sector (Ha, 2002). As a result, patient volume declined significantly at the commune and district health centers, leaving the commune health centers (CHCs) to mainly treat those who were too poor to afford private sector services and running vertical national targeted health programs (NTPs) (Ha, 2002; Fritzen, 2009).

Public expectations and demands for quality health care corresponded with Vietnam's impressive socio-economic growth. Peoples' perception of low quality services and low quality health personnel at the local CHC level and the general mistrust of the Vietnamese public towards the staff of district level institutions resulted in many people preferring to go directly to the often severely overcrowded provincial and national hospitals (Philips, 2006, unpublished). Additionally, for those with economic means, this results in bypassing the public sector all together and choosing the private sector including international clinics or going abroad for medical care (Cheng, 2014). The proliferation of private clinics and presence of domestic and international private hospitals is a testament to this trend (Cheng, 2014). However, the private sector is not only for the rich. Examples from other developing countries such as China show that in the rural areas, people frequently purchase drugs from drug sellers or see a private practitioner (usually a public employee working after-hours) (Bloom, 1997). Although the marketization of rural health services has given people more choice, subsequently, it also exposes them to more risks in the quality to care and medical products that they receive (Bloom, 1997).

In addition, the changing epidemiological profile, from communicable to non-communicable diseases and from acute care to chronic care, has stretched the capacity of CHCs and the general health system, originally set up to implement NTPs targeting single diseases and patients who only require a one-time interaction with the health system (Minh, 2014). Finally, with demand for CHC services on the decline, accompanied by low salaries and incentives, health workers are increasingly migrating to

the private sector, leaving few available health workers at the community level and increasing the burden at provincial and national health centers (Fritzen, 2009). This may also increase the cost of the health system as a whole.

Primary Care First Strategy

The strong commitment and political will for equitable health care for all is a central tenant for the Communist Party of Vietnam, and therefore, has resulted in a robust primary care network in Vietnam to address communicable diseases and acute illness and medical issues. This has led to remarkable gains in population health and Vietnam's early achievement of the U.N.'s Millennium Development Goals (MDGs). As part of MDG 4, under-five mortality and infant mortality rates have been halved between 1990 and 2006 (UNICEF, 2012). With MDG 5, maternal mortality declined considerably over the last two decades, from 240 per 100,000 live births in 1990 to 59 per 100,000 live births in 2010 (WHO, 2011). Approximately two thirds of the decrease is related to safer pregnancy and skilled attendant deliveries at CHCs (UNICEF, 2012). Through CHC networks, Vietnam has more than 90 percent child immunization coverage and is able to manage tuberculosis, malaria, and child malnutrition (Tien, 2013).

However, as Vietnam's disease epidemiology evolves to that of chronic diseases, income levels and standards of living rise, the population expectations for the quality of care and services delivered also increase (Minh, 2014; Philips, 2006, unpublished). There has been little research on the current capacity of the primary care system, or CHCs, in Vietnam to deliver NCD prevention and control services. Only one paper, published in 2014, looked at the capacity of the CHCs to deliver treatment services in one district in northern Vietnam (Minh, 2014).

Purpose of Inquiry

In this study, I conducted a critical and systematic review of the existing literature on NCDs in Vietnam, and also reviewed the existing policy documents on NCDs from the GOVN to understand how the current policies support NCD service delivery at the CHC level. I also assessed the burden of NCDs in the public CHCs in three provinces,

comprising of six districts and 89 CHCs in northern Vietnam, and investigated the current challenges of the health system and opportunities for improvement with regard to prevention and control of these diseases at the CHC level. I examined the five chronic diseases that contribute to the majority of morbidity and mortality as set out by the WHO as well as the accompanying four common risk factors that they share. I sought to determine the burden of NCDs at the CHCs based on patient demand for services; and understand the NCD service availability at CHCs by evaluating types of prevention, diagnostic and treatment services, if any, are offered by the CHCs, and the supply of basic medication and equipment as set out by the WHO-PEN list of essential supplies for NCDs. I hypothesized that there would be variability between the different geographical regions studied regarding NCD service availability and sought to identify factors that contribute to this variability. I also hypothesized, based on previous knowledge of the Vietnam health system, that Vietnam's successes based on a vertical programming, disease-specific focus contributes to the weak delivery of NCD services at the CHC, and through a policy analysis and literature review, will discuss reasons why the current infrastructure is weak, and the opportunities for reform to achieve comprehensive NCD service delivery at the CHCs.

I am the principle investigator of this research. This research is funded by the US State Department Fulbright Fellowship, the Harvard Medical School Center for Primary Care, and the Scholars in Medicine Office at Harvard Medical School.

Methodology

This is a mixed-methods research study incorporating both a critical review of the existing published and gray literature and policy documents on NCDs in Vietnam and a quantitative facility level assessment of CHCs and their readiness and availability to deliver NCD services.

Institutional Review Board: This study was reviewed by the Harvard Medical School Institutional Review Board (IRB) and was approved for IRB exemption, Protocol 23835. This study also underwent IRB Review by the Hanoi Medical University, and was also approved for IRB exemption.

Literature Review

A critical review of the published literature on NCDs (in general), NCD specific diseases (diabetes, CVDs, chronic lung diseases, cancer, mental illness), and NCD risk factors (tobacco consumption, inactivity, unhealthy diet, obesity, alcohol consumption), in Vietnam or where Vietnam was a study site in a multinational study was conducted in using five databases (PubMed, Embase, CAB, CINAHL and Web of Science). All articles published before April 2014 was considered. A complete search strategy with specific MeSH terms is detailed in Appendix 1. Of note, from the onset, we made sure to include in the search strategy exclusions for articles on Vietnam veterans, Vietnamese populations outside of Vietnam and the Vietnam war. The Countway Library of Medicine reference librarian Ms. Julia Whelan developed this search strategy. Results were imported into a reference manager (EndNote X7, 2014) and duplicates were eliminated.

Inclusion criteria include studies that discuss one, multiple or all of the NCD diseases of focus (diabetes, CVD, chronic lung diseases, cancer, mental illness) and/or NCD risk factors (obesity, physical inactivity, tobacco consumption, alcohol consumption), including interventions, descriptive studies, and case-reports, limited to any of the 56

ethnic groups living in Vietnam, and also any multicountry studies in which Vietnam is a country in the study.

Exclusion criteria include: studies on Vietnamese people living outside of Vietnam; studies which are focused on Vietnamese veterans of the Vietnam War; studies which focus on PTSD or any mental illnesses of Vietnamese or Vietnamese veterans OUTSIDE of Vietnam; and drug trials for NCD related drugs on Vietnamese populations inside or outside of Vietnam.

Three reviewers (Ms. Julia Whelan, a research assistant, and the PI) reviewed the titles and abstracts to filter out articles that did not fit the inclusion criteria.

Aside from the published literature, unpublished literature including reports, government/non-governmental documents, and legal documents were also collected and reviewed. These documents were collected from workshops and meetings on NCD prevention and control in Vietnam during the 2013-2014 academic year, online and physical archives from the MOH, WHO and World Bank offices in Vietnam and on their internet portals.

CHC Facility Assessment

Sampling Strategy: Northern Vietnam has three distinct geographical regions: the Red River delta, the northern midlands, and northern mountainous region with a total of 24 provinces. For this study, one province from each of the three geographical regions was chosen. Three provinces had previous NCD interventions by WHO/other iNGOs (Phu Tho, Thai Nguyen, Thai Binh) and therefore were not considered for the study, leaving 21 provinces. Provinces were separated into their geographical regions and were chosen based on a weighted composite score consisting of average BMI, and prevalence of self-reported alcohol consumption, and prevalence of self-reported tobacco consumption. The province with the highest composite weighed score for each geographical region was selected: Hai Phong in the Red River delta, Bac Giang in the northern midlands, and Dien Bien in the northern mountainous region. A high BMI, a high prevalence of alcohol and

tobacco consumption are shown to positively correlate with NCD prevalence, as they are major NCD risk factors (Musaiger, 2012; WHO, 2010; WHO, 2014). These data were taken from the National Nutrition Survey conducted in 2010. By doing this, provinces that are believed to have a high prevalence of NCDs were targeted. Within each of the three provinces, two districts were chosen based on convenience sampling, and all CHCs within each district were sampled via a mail-in questionnaire (N=89). Three CHCs per district were chosen for visits by the research team for in-depth surveying and checking the questionnaires for accuracy. These CHCs were chosen by the district health center for teams to visit based on a variety of factors including (1) being representative of the economic and geographical diversity in the district, (2) travel time from the district health center, and (3) ease of travel to the CHC.

Study Tool Development: The availability of NCD services at the CHC was determined using a modified version of the WHO Service Availability and Readiness Assessment (SARA) tool (WHO, 2012). Sections of the SARA tool that surveyed communicable diseases service readiness and availability were taken out. In addition, a section on NCD financing, and NCD risk factors (inactivity, tobacco use, alcohol use, and unhealthy diet) were added. Medications and medical equipment check-lists for NCDs in the SARA tool are the same as those in the WHO-PEN, and were cross referenced with the 2012 Vietnam national essential medications and equipment list and included only if they were on the both lists. The sections on NCD risk factors and NCD financing were adapted from the WHO Facility Assessment for NCDs developed by the WHO/Vietnam team (WHO/Vietnam, 2013). The final tool was developed in English by the research team with advisers from the WHO Vietnam Office, Harvard Medical School Center for Primary Care, and the Hanoi Medical University Center for Health Systems Research. The tool was translated into Vietnamese by a certified public health translator and back translated into English to ensure accuracy. The tool was piloted at a non-study site outside of Hanoi by members of the research team and revised in Vietnamese, before finalization.

All members of the research team were involved in the development of the modified SARA tool, and all members participated in a 1/2 –day training and review of the study tools lead by the PI before going to conduct the assessment.

Data Collection: The three selected provinces were invited to participate in the study through official government channels with a letter of request signed by the Rector of Hanoi Medical University briefly introducing the study and members of the research team, a sample schedule of the three-to-four day research activities in the province, a request of who to interview in the province, a request for the director of provincial department of health (DOH) to delegate a staff member to receive the research team and coordinate the logistics in the province, and finally, it outlined compensation for those partaking in the research in the province. Compensation was provided at the rate and cost-norms specified in the official Vietnam Ministry of Health Compensation Scale. All three provinces invited to participate in the study accepted the invitation.

The modified SARA tool was sent by mail with detailed instructions to the provincial department of health, and then distributed to the district health centers. There, commune health center directors were invited to receive the tools and given a tutorial on how to fill in the tool by a staff member of the provincial department of health. One to two weeks after the receiving the SARA tool, CHC directors sent back the tool to the district health center. All members of the research team visited all district health centers to collect and audit the filled in surveys, and then visited the three CHCs per district to check the accuracy of the tool (N=18).

Data Management: Data were collected on paper forms and kept in a secure locked cabinet at the research office at Hanoi Medical University. Immediately after each data collection trip, the data were coded and entered into a password protected computer. Once all of the data was gathered, coded and entered, discrepancies were resolved by members of the research team calling individual health facilities. Data were cleaned by the PI, and imported into STATA 11 data analysis software.

Data Verification: The data we collected were based largely on survey responses via postal mail. It is likely that we have errors in our data. The source of errors consists of systematic and random errors. Systematic errors refer to errors that could be due to consistently over-reporting or under-reporting for some reasons which could lead to misclassification, for example, over-reporting of the medication availability for certain drugs, or equipment, or patient volume. Random errors refer to measurement errors, or unintentional inaccuracy in reporting. We could only assess the errors due to discrepancies in verbal reporting and differences between written data in documents and entered data from data entry. We randomly selected a subset of CHCs (N=18) and collected that data twice, from survey responses via postal mail, and from in-person interviews. Any discrepancy between the two procedures on any variable is considered an error. We divided the number of errors to the total number of variables in the questionnaire. This is the point estimate of our error rate. We then calculate the upper bound of the 95% confidence interval of this point estimated. We will report this estimate of error for our study. We expect this estimate to be less than 0.1%.

Data Analysis: STATA 11 was utilized for analysis. The variables regarding availability of NCD medications and NCD equipment were collapsed into one binary variable, respectively, if the CHC reported having at least one of the medications or piece of equipment. Descriptive analysis along with t-test and chi square were utilized. A p-value of <.05 was considered statistically significant

Results

Critical Literature Review

From the MeSH search strategy, a total of 1347 non-duplicate citations were found. Of the 1347 citations, a total of 471 were found that met the inclusion criteria. 92% of the published papers (N=424) are descriptive studies that were either of a cross-sectional sample across different geographical areas or case reports on one particular location. 71% of the published literature (N=330) focused on one or more of the five major NCD diseases. 56% of the published literature (N=278) is focused on the urban areas, mainly Hanoi and/or Ho Chi Minh City. Only 2% (N=9) articles studied an NCD intervention, with only one article describing a medical intervention (control of hypertension), and the other eight articles focusing on behavioral interventions. There were no articles that discussed NCDs among Vietnam's ethnic minority population and no articles that focused on the role of the private sector on the NCD epidemic. At the time of writing this thesis, only one article was found that focused on the NCD service readiness and availability at CHCs in Vietnam. The article examined 18 CHCs in one district in one province (Thai Nguyen) in the northern midlands region in Vietnam (Minh, 2014).

A search of the gray literature and government documents was also conducted which resulted in seven important documents which effectively outlines Vietnam's response to the NCD epidemic. These documents include: the Ministerial Decision No 77/2002/QĐ-TTg in 2002 establishing the National Program for Prevention and Control of Non-communicable Diseases (National NCD Program), the five disease specific program documents (the National Mental Health Program, the National Cancer Control Plan, the National Hypertension Program, the National Diabetes Project, and the National Chronic Respiratory Disease Program) outlining governance structures, funding mechanisms, program goals and objectives and implementation plan, and the National Tobacco Control Policy. These main documents, along with their associated decrees and circulars are discussed below, organized by NCD disease area and NCD risk factors. Of note,

Vietnam is currently in developing the National NCD Prevention and Control Strategy for 2015-2020 with a vision towards 2030, which the author is a contributor.

In addition to NCD specific documents, in 2000, the MOH released MOH Benchmark Standards for CHC readiness, comprising of 90 indicators of equipment availability, facility standards, staffing and other criteria. The MOH Benchmark Standards also stipulate a minimum of five staff per CHC, with a maximum of ten, depending on location and population coverage area. Each CHC should be lead by the physician or a physician's assistant, as the CHC's highest trained clinician, and employ a full time traditional medicine specialist, one village health worker per hamlet, one population/family planning officer (usually a PA or nurse), one pharmacist, and one midwife. The latest version of these benchmark standards was revised in 2011 as MOH Decision 3447/QĐ-BYT dated 22/9/2011.

National Mental Health Program

The national program on community mental health was established in 1999 as a stand-alone program, and became apart of the National NCD Program in 2002 as the National Mental Health Program (NMHP) (Harper, 2011). This program is funded by the central and provincial governments. The NMHP focuses on schizophrenia and epilepsy. The program is implemented through the MOH network of psychiatric hospitals, which was established in 1999. These hospitals are at the central and provincial level. Patients are referred from the community level by CHCs directly to provincial hospital for treatment and establishment of medication regimen. Following stabilization, patients are sent back to their respective communities for medical management by CHC staff. The goal of the program is for community management of schizophrenia and epilepsy. Although originally intended to be a part of the NMHP, depression is not included as an illness to be managed at the CHC level. Anecdotal reports from ad hoc NCD meetings during the 2013-2014 year that the author participated in indicate the reason depression is excluded is because of a to lack of financial resources, limited health staff and unclear algorithms for treatment and management of people with depression. Depression however has been

targeted in prevention activities and in the future, there is a desire to include depression management at the CHC level.

Community campaigns utilizing television, magazines and other forms of mass media have focused on recognizing symptoms for epilepsy, depression and schizophrenia, and the value of early detection. Specifically, the program aims to increase awareness in the community that mental illness is a medical issue rather than being caused by “spirits” (Harper, 2011).

The National Cancer Control Plan

The National Cancer Control Plan (NCCP) was started in 2008 with leadership from the National Cancer Hospital and three oncology hospitals across the country. NCCP aims to reduce the burden of cancer through primary prevention, early diagnosis and screening, successful diagnosis and treatment, and palliative care (Nguyen, 2011). NCCP focuses on screening and early detection of breast, cervical, oral-pharyngeal and colorectal cancers. For palliative care, the aim is to have community level management with oral morphine and morphine patches (Nguyen, 2011). At the time of publication, finalization and distribution to local levels of specific community based guidelines for opioid management, aligned with the WHO analgesic ladder, is still in progress. The NCCP also aims to create cancer registries, which at the time of publication of this thesis has not happened. The program is funded approximately \$1.5million/year—however, the amount falls short of the amount necessary to implement the NCCP across all of Vietnam, therefore only the high priority actions of prevention, early detection and screening, and palliative care were implemented in six high priority provinces (Hanoi, HCMC, Hai Phong, Thai Nguyen, Hue and Can Tho). In 2010, nine additional provinces (Bac Can, Bac Ninh, Bac Giang, Nam Dinh, Thanh Hoa, Da Nang, Binh Dinh, Kien Giang and Ca Mau) were added to the NCCP program, covering a total 16 provinces out of 56 provinces in Vietnam (Nguyen, 2011). Methodology of identifying high priority provinces was not found in the published or gray literature.

Other than the screening goals described above, primary prevention activities include utilizing mass media to communicate the associations between cancer and tobacco and alcohol, and promoting food safety and physical activity. In 2010, the NCCP steering committee developed nutrition guidelines to prevent cancer in collaboration with NIN, and also co-developed messaging around the hazards of tobacco products with VINACOSH. Prevention by the way of physical activity and reduction in alcohol consumption has not been addressed.

The National Hypertension Program

Established in 2008, funds for implementing the National Hypertension Program were not disbursed until 2010. The National Heart Institute in Hanoi provided governance for the NHP. Initially 32 provinces and cities implemented the NHP in some CHCs, and currently, a number of CHCs in all provinces/cities are implementing the NHP. Not all CHCs within each province are included in the NHP due to a lack of resources from the central level. The goal of the NHP is to conduct screening and early detection activities at the community level and have hypertension treated and managed at CHCs with referrals to higher level hospital for complicated cases. Financing for the NHP is a mix of central, provincial, insurance and out-of-pocket payments (Minh, 2014; Ha, 2013). The central and provincial government supports prevention and screening activities. Insurance and out-of-pocket payments pay for medication.

The NHP has utilized television, radio, print and public information panels at CHCs, and also trained paramedical personnel—village health workers (VHWs)—to distribute leaflets on prevention and early signs and symptoms for hypertension. A nationwide “Hypertension Day” was established on the 15th of May to generate discussion and promote blood pressure checks around the country. Additionally, a website for the general public and for health professionals has been developed (huyetap.vn) to provide information and resources.

The National Diabetes Project

The National Diabetes Project (NDP) was created in 2008, but not funded until the end of 2009. The program aims are to do population based screening for early detection at the CHCs, with treatment and management at the district level. The program is managed by the National Hospital of Endocrinology (NHoE), and funded by multiple sources including the GOVN, WHO, and various foundations. In 2010, population screening for early detection took place at 1-2 communes in 30 provinces. The provinces and communes were selected based on anecdotal information that the commune may contain an elevated prevalence of people at risk for developing diabetes (Harper, 2011). On-going consultations and management for diabetes were provided to people diagnosed with diabetes and pre-diabetes. Consultations are provided free of charge to the patients, and the CHC or district facility is reimbursed 5,000VND (\$0.25) per consultation from the program budget. Medication, if necessary, is provided only at district facilities, therefore, if patients receives consultation at the CHC, they need to travel to the district health facility to receive their medications. There is an understanding that this implementation model is not sustainable or efficient, however, at the time of this publication, it has not been changed.

The NDP has provided health education for the community to all provinces to promote prevention and control of Type 2 diabetes through television, radio and print media. The materials were developed in collaboration with NIN and the National Health Communication and Education Center.

National Chronic Respiratory Diseases Project

In 2011, the National Chronic Respiratory Disease Project (NCRDP) was added to the National NCD Program. The NCRDP targets COPD and asthma (Harper, 2011). At the time of research and publication, the author is unable to find any published or gray literature regarding the implementation of the NCRDP in Vietnam.

The five NCD programs, described above, are being implemented by hospitals/institutes that are primarily focused on disease treatment. Disease prevention is not emphasized

other than through mass media campaigns. Also, due to the lack of permanent coordination body for NCDs, the prevention, treatment and management components of the programs are being implemented independently of each other, specifically at the CHC, despite the fact that these diseases share common risk factors and often are co-morbidities for one another. As a result, there have been minimal gains in the health status of the nation-wide population (Harper, 2011). In fact, as described above, the burden of NCDs is growing and there is clear evidence that the epidemic will continue to significantly increase its impact in Vietnam.

Of note, measures for the prevention and control of tobacco consumption has received special attention from the Vietnamese government. In 2000, the Prime Ministerial Resolution enacted the Government Resolution No. 12/2000/NQ-CP, known as the 2000–2010 National Tobacco Control Policy, that prohibits smoking in theatres, offices, health facilities, schools and other public areas. Vietnam also signed the Framework Convention on Tobacco Control (FCTC) on August 2003, which was ratified on December 2004 by the National Assembly. In 2007, the government issued Directive No. 12/2007/CT-TTg in order to strengthen tobacco control activities in Vietnam. The directive emphasized six key initiatives: 1) promoting health education on the harmful effects of tobacco use; 2) strict implementation of smoking bans at indoor workplaces and public areas; 3) putting health warning labels on cigarette packs (covering 30% of the cigarette packaging); 4) strict control of cigarette sales; 5) banning cigarette advertising, sponsorships and marketing; and 6) increasing the tobacco tax. On August 2009, the Prime Minister issued Decision No. 1315/QĐ-TTg ratifying the Action Plan for the Implementation of the WHO FCTC. The Action Plan provides contents, time frames and guidelines on the delegation of responsibilities to related agencies for the development and promulgation of a domestic legislation that meets the FCTC requirements. Finally, in 2013, the first comprehensive tobacco control legislation took effect, after being adopted by the National Assembly in 2012. The new law mandates smoke-free places, increases the size of graphic health warning labels, restricts tobacco advertising, promotion and sponsorship, and establishes a tobacco control fund.

Other than tobacco, there has been limited emphasis and attention on the other major NCD risk factors including alcohol consumption, diet and physical inactivity. In 2014, ad hoc NCD task force meetings discussed a potential alcohol tax and a sugar tax, however, these two initiatives are in discussion phase only (National NCD Steering Committee Meeting, Hanoi, April 2014). The lack of emphasis on prevention of NCDs and programming around the shared risk factors (alcohol use, tobacco use, inactivity, unhealthy diet) of NCDs, along with national budget constraints, lack of donor emphasis, and insufficient research on strategies around the early detection and comprehensive treatment of NCDs have also contributed to the limited success over the National NCD Prevention and Control Program.

Commune Health Center Facility Assessments

In 2013, according to the General Statistics Office (GSO), there are 11,400 CHCs and 597 districts in Vietnam, both in urban and rural areas. In the geographical area of interest for this study (Red River Delta, Northern midlands and Northern Mountainous areas), there are a total of 4,193 communes. For this study, a total of 89 CHCs were surveyed from the following geographical regions: Red River Delta (Hai Phong Province) (N=20), Northern Midlands (Bac Giang Province) (N=37) and Northern Mountainous (Dien Bien Province) (N=32 CHC). There was a 100% response rate among CHCs that were invited to participate in the study who responded to the survey.

Please see table 1 for an overview of each of the three studied regions which gives a snapshot of their total land mass, economic status, and selected population and health indicators. Hai Phong, representing the Red River Delta is the most populous, with the highest GDP, highest literacy rate, and smallest land area. The province has .76 physicians per 1,000 people, and a ratio of 2.3 health professional (non-physicians) per 1,000 people. Regarding public medical facilities (hospitals and out-patient clinics), Hai Phong has 7.7 facilities per 1,000 people. On the other end of the spectrum, Dien Bien, representing the northern mountainous region has the lowest GDP and population and the largest land mass. It has a ratio of .80 physicians per 1000 people, and a ratio of 4.2 health professional (non-physicians) per 1,000 people.

Table 1 also shows NCDs risk factor distribution among the three geographical regions. NCDs share common risk factors. The main ones according to the WHO are alcohol use, tobacco use, inactivity, and unhealthy diet. Data taken from the 2010 National Nutrition Survey gives a snapshot of each province's prevalence of these risk factors (table 1). BMI (a proxy for both inactivity and unhealthy diet), self-reported alcohol consumption, and self-reported tobacco consumption were extracted. The northern mountainous region has the highest prevalence across all two risk factors, and the highest BMI.

Infrastructure & General Services

Table 2 displays the results in aggregate of all three provinces and separately by each province for availability of a phone, computer, Internet, electricity, water and a private examination and consultation room, all of which are included in the MOH Benchmark Standards as outlined in Decision 3447/QĐ-BYT dated 22/9/2011. Overall, greater than 85% of CHCs report have all infrastructure components measured, with the exception of access to a private examination and consultation room.

62% of CHCs reported having a physician as the most highly trained staff, and the remaining 38% had a physician assistant. The Red River Delta region has the least number of CHCs staffed by a physician, followed by the northern mountainous region, and then the northern midlands have the most. Aside from a physician or a physician's assistant at the CHC, each CHC also has an average 2.5 staff, comprising of nurses, midwife, and/or pharmacist. The average number of village health workers per CHC is 7.1. No statistical significance exist between the provinces of either having a physician or physician assistant as the highest trained clinician, or the number of other staff and village health workers employed by the CHC.

Table 3 gives a snapshot of the general services provided at the CHCs, organized into maternal and child health, communicable diseases, procedures, and diagnostics and commodities. In general, service availability for maternal and child health, including providing child birth services and newborn care is available at over 90% of CHCs, with the exception of adolescent health services, available at 80% of the CHCs. For communicable diseases, diagnosis and treatment of tuberculosis is available at 95% of CHCs, whereas for HIV services, HIV counseling is available at 86% of CHCs. Diagnosis and treatment of STIs other than HIV is available at 65% of CHCs. Services such as laboratory diagnostics and testing, and minor procedures (suturing, wound debridement/closure, tooth extraction), including early abortive services are offered at less than 50% of CHCs. Finally, the majority (97%) of CHCs report being able to store medicines, vaccines and contraceptive commodities.

NCD Service Availability

Table 4 breaks down the NCD services available by diseases (diabetes, hypertension, chronic lung diseases (COPD and asthma), cancer and mental illness (schizophrenia and epilepsy)). There is high variability in the availability of NCD services. Mental illness services are available at 96% of CHCs surveyed whereas cancer services only at 22%. Services for diabetes, hypertension and chronic lung diseases have statistically significant ($p<.001$) variation among the different regions, with highest availability in either the Red River Delta or northern midlands (Hai Phong or Bac Giang), and the lowest availability in the northern mountainous region (Dien Bien). Although not statistically significant, a similar trend is seen for cancer service availability, with the highest number of CHCs offering services in the Red River Delta (35%) and the lowest in the northern mountainous region (11%).

For CHCs that report providing services in the NCDs, the data are further broken down into the type of services provided: screening and early detection, and treatment of those diseases (figure 4). Of the CHCs reporting providing diabetes services (N=47), a general trend can be seen that screening and early detection is the predominant service (78%), rather than treatment (19%). This trend is similar in cancer services as well. 19 CHCs report providing cancer services, and of these, 52% (N=10) report providing screening and early detection services, and 19% (N=9) report treatment services, which from a review of the NCCP consist of morphine for palliative care. For hypertension and chronic lung disease services, we observe that services for screening and early detection and treatment are comparable. 57 CHCs reported delivering services around hypertension. Of these CHCs, 68% report offering early detection and screening, and 61% report offering treatment services. Only 36 CHCs reported providing services for chronic lung diseases. The overall trend is that among these CHCs, more report providing treatment services (86%) than screening services (72%). For mental illness, 83 out of the total 89 CHCs surveyed provide services for schizophrenia and/or epilepsy. The general trend is that most provide screening and early detection services as well as treatment services, 81% and 92%, respectively. Although there was statistical significance between the geographical regions in whether or not they provided NCD services (table 4), if a CHC

did indicate they provided NCD services, there was no statistical significance between the geographical regions on the types of NCD services provided (screening and early detection versus treatment).

Medications & Equipment

Figure 5 shows the availability of diabetes, hypertension and chronic lung disease medications and equipment at the CHCs. CHCs that reported having at least one of the medications or equipment for a particular disease category were coded as having the medication or equipment for that particular disease category. For example, if the CHC had metformin, but not insulin, they would be considered as having a medication for diabetes. The overall trend is that across the three different disease groups, equipment availability is much higher than medication availability. Diabetes equipment consists of a reflex hammer/tuning fork to test for neuropathy, ophthalmoscope, and glucometer. CVD equipment included an EKG machine and manual or digital sphygmomanometer. Chronic lung disease equipment was peak flow meters, spacers for inhalers and nebulizer. 98% of CHCs (N=88) report having at least one type of NCD equipment. In general, availability of equipment for diabetes and hypertension are more available at CHCs, 95% and 96% respectively, as compared to equipment of chronic lung diseases (76%). In contrast to NCD equipment, only 47% of CHCs (N=42) report having at least one type of NCD medication. There is only statistical significance across the three geographical regions for availability of NCD medications ($p<.05$), with the northern mountainous region having the lowest availability of NCD medications. Only 3% of CHCs report that they carry at least one type of diabetes medications (metformin, glibenclamide or insulin). 9% of CHCs report having available salbutamol and/or beclomethasone inhalers for the treatment of chronic lung diseases (COPD, asthma). 31% of CHCs report having at least one type of anti-hypertensive (beta-blocker, calcium channel blockers, ACE-I, diuretic) or aspirin.

NCD Preventative Services

All CHCs were surveyed on whether or not they delivered NCD prevention services regarding alcohol use, tobacco use, inactivity, and unhealthy diet (table 5). Overall, less

than 25% of CHCs conducted NCD prevention services, with a trend that the Red River Delta and northern midlands region offering more preventative services than the northern mountainous region. This trend is statistically significant for prevention services around inactivity, diet and tobacco.

NCD Services Financing

For financing of NCD medications, CHCs were asked if they had the medication, and if they did, how was it financed for the patient. The majority of CHCs did not carry NCD medications, with the exception of mental illness medication, which 91% of CHCs reported having. With the exception of CVD medications that were either 100% or partially paid by health insurance, the majority of medications were paid for by out of pocket expenses from the patient. For mental illness medications, 86% of CHCs reported that the government finances 100% of the medications. For testing and diagnostics, most CHCs (>75%) did not conduct any testing/diagnostic services. For those that did, 15-20% of CHCs report that those services are paid out of pocket by the patient.

NCD Patient Volume

82 out of 89 CHCs reported on patient volume over the past month (table 6). CHCs report seeing a mean of 223 patients/month, and 15 patients/day, for all causes. There is, on average, one physician or physician's assistant at a CHC, 2 nurses, a pharmacist and a traditional (Eastern) medicine specialist. The variation between geographic regions for patient volume is significant ($p < .05$) with the Red River Delta region experiencing the most number of patient visits per month (317) and the previous day (23), and the northern mountainous region with the least, 166 and 8, respectively.

For NCD specific patient visits over the past month, the mean number of patients for month for CVD is 10, diabetes is 1.5, chronic lung diseases is 4, cancer is .5, and mental health is 15. In aggregate, NCDs visits makes up less than 15% of all visits at the CHC. The difference of NCD visits also significantly vary between provinces ($p < .05$) for diabetes, chronic lung diseases, cancer and mental illness visits. The northern

mountainous region has the lowest number of patients seen in every NCD category, with the exception of mental illness, with 23 patients as compared to northern midlands and

Discussion

This study consisted of two components in order to understand the availability of NCD services at CHCs in northern Vietnam. The first component was a critical review of the existing published and unpublished literature regarding the NCD situation in Vietnam, and analysis of official documents to understand the GOVN response to the NCD epidemic. The second component was a facility assessment of 89 CHCs in three different geographical regions in northern Vietnam to provide primary data that captures the current state of NCD service delivery at CHCs. This section is divided into three parts. The first part will briefly discuss the results from a critical literature review, and then explore how national and political policies and strategies may explain the current NCD situation at the CHC level, as seen from the facility assessments in this study. The second part will be an in-depth discussion of the key findings from the facility assessments, including major challenges and weaknesses. Finally, the third part will discuss the opportunities for CHC delivery of NCD services, as found in this study.

Critical Literature Review and Political Analysis

A critical review of the existing literature demonstrates the need for more research at the CHCs level with regards to delivery of NCD services. To date, only one published paper (Minh, 2014) exist on NCD delivery at the CHC level, and this study is the second, and the only known multi-site study that does not include the major urban areas of Hanoi and Ho Chi Minh City, but rather, includes a mountainous site with the high concentrations of ethnic minorities and vulnerable populations. No previous research has been identified in either the published or gray literature on these populations. In addition, this study is the first known study to evaluate both the availability of NCD treatment and preventative services offered at the CHC level.

In order to set appropriate national targets, countries need to start with assessing their current capacity in the readiness and availability of their health system to deliver NCD services (Medis, 2010; Peck, 2014; WHO, 2014). This review of the published literature

underscores the urgency in which Vietnam needs more data, specifically data at the CHC level, in order to inform appropriate national targets and the strategies required to meet them.

The GOVN response to the NCD epidemic should be lauded. Although an independent review conducted in 2011 of the results of the GOVN NCD Prevention and Control Program 2002-2010 showed that there were no gains in health status and, despite the implementation of the program, the NCD epidemic continued to increase (Harper, 2011), including an increasing in the prevalence of the four most common risk factors (Son, 2012; Minh, 2014; Giang, 2013; Trinh, 2008; Jensen, 2014) the act of establishing the NCD program in 2002 is an achievement in itself since it showed commitment at the highest levels of government. Vietnam was among the first countries in Southeast Asia to establish a national program on NCDs in 2002, well before the Moscow Declaration and UN Political Declaration on NCDs in 2011. However, because the NCD Prevention and Control Program was implemented as disease specific, separate vertical programs, under the jurisdiction of separate national specialty hospitals or institutes (National Cancer Control Program, 2010; Master Plan for Diabetes Mellitus Control and Prevention, 2010; National Hypertension Program, 2008; National Mental Health Program, 2002), which likely contributed to the program focused on disease treatment rather than prevention activities. We see this in our data, where less than 25% of CHCs offer preventative services on the four most common NCD risk factors (alcohol consumption, inactivity, health diet and tobacco control). Please refer to the section on preventative services below for further discussion.

Additionally, although the National NCD Prevention and Control Program was started in 2002, our review indicates that the hypertension, diabetes and cancer programs did not get funded until 2008 and 2009, which may explain the low availability of services for these diseases at CHCs (22%-64%) as compared to mental illness which 96% of CHCs report having services available. The national mental health program, with the aim of treating schizophrenia and epilepsy at the community level, was initiated in 1999 and became apart of the National NCD Prevention and Control Program in 2002.

The National Target Program Approach

As mentioned above, the National NCD Prevention and Control Program is being implemented as a series of disease specific programs managed by specialty hospitals/institutes. This model of implementation is consistent with previous health programs in Vietnam (Tien, 2013), utilizing the top-down vertical programming model in the form of national target programs (NTPs). The historical successes of the NTPs, 16 which exist in all, coupled with the authoritarian top-down style of GOVN consistent with one-party rule in Vietnam makes the NTPs style extremely attractive and fits nicely within the current governance structure. Through the NTPs, Vietnam has made substantial population health gains (Figure 6), therefore it makes sense that leaders would want to utilize a similar strategy for NCD prevention and control. However, vertical programs in the form of NTPs are often disease focused, funding specific, often silo-ed, works well for single point-in-time care and with concentrated decision making at the top (Banerji, 1984; Rifkin, 1986). NCDs require a different approach since the individual NCDs often serve as co-morbidities for one another (i.e. diabetes is a co-morbidity for CVDs), and NCDs require integrated, longitudinal care that should be responsive to the context of the community (Lawn, 2008; WHO, 2010). Also, because NCDs share common risk factors, it is crucial that prevention, early screening and detection be well integrated with care and medical management. As our data demonstrates, this is still a challenge. For example, of the CHCs that offer diabetes services (N=47), 78% offer screening and early detection services but only 19% offer treatment. From a review of the Master Plan for Diabetes Mellitus Control, patients can only get screened at the CHC, but need to go to the district health facility for diabetes medications. Of all of our CHCs surveyed (N=89), only 3% report having diabetes medications available. In the current scenario with diabetes, the patients' prevention and treatment is not integrated at the CHC level. This example serves to illustrate that NCD prevention and control may require a different approach than the NTPs of the past, and this may be another factor in why the National NCD Prevention and Control Program may not have resulted in the health gains as previous NTPs.

NCD Services at Commune Health Centers

The three geographic regions—the Red River Delta, the northern midlands, and northern mountain, selected for this study represent the topography and diversity of northern Vietnam, which is associated with the diversity seen in their population and health indicators. For example, because both the Red River Delta and the northern midlands are in the low-land regions, inhabited to the *Kinh* (ethnic Vietnamese) population, people in these provinces participate in wet rice cultivation and have historically been exposed to more economic opportunities than that population of mountainous areas, which consist of both *Kinh* and ethnic minorities including the H'Mong, Black Thai, Red Thai and Zao peoples. The mountainous terrain has led to dry and terrace rice cultivation as well as slash-and-burn agriculture, and decreased economic opportunities. The predominance of ethnic Vietnamese, along with increase economic opportunities may explain why the Red River Delta and the northern midlands have a higher GDP (38.2 million VND and 23 million VND per person per year), and have higher literacy rates (98.5% and 97.7%), respectively, while the mountainous region's GDP is 17 million VND/person/year with a literacy rate of 71.4%. Given the differences in geography, ethnicity and socioeconomics, we hypothesized that there would be statistically significant differences in terms of service readiness and availability of NCDs at CHCs between the provinces.

This claim is supported by this study as we can see by the statistical significance in differences around the availability of services for diabetes, hypertension and chronic lung diseases, with consistently lower availability of services in the northern mountainous region. The same pattern is seen with NCD preventative services. One explanation can be that the northern mountainous region may have other competing health priorities as compared to other regions. When population health indicators are examined, the northern mountainous region, represented by Dien Bien province, has higher rates of child malnutrition, infant mortality, maternal mortality, and infectious diseases such as malaria (table 8) than the national average. This double burden of disease stretches the existing health system's human and financial resources and therefore may lead to lower investments in NCD services. Since this study is the first multi-site study, there are no other studies to compare the results from this study.

With the exception of services around mental illness, our study demonstrates a low level of availability of NCD services at the CHC level. This claim is supported by the only other study to look at NCD service availability at the CHC level. In a single province study of 18 CHCs in the northern midlands, which is comparable to Bac Giang province in this study, Minh et al concluded that the capacity of the primary care health system is inadequate to provide NCD prevention and treatment for the population (Minh, 2014). Reasons include inadequate human resource capacity, insufficient integration of NCD activities, cost of treatment and CHCs lacking in medication and equipment (Minh, 2014). From the results section, a similar conclusion can be made from this study across all study sites, and specifically with less availability of services in the northern mountainous region.

For CHCs that do have NCD services available, the trend is that there is more screening and early detection than treatment. This trend holds true for diabetes, chronic lung diseases and cancer. This trend can be explained by the mission of the NTPs for these diseases to screen and detect at the CHC level, but conduct treatment at the district level or higher. We discussed the example of diabetes above. This is in contrast to hypertension and mental illness. The NHCP and NMHP aims are to both screen at the CHC and provide treatment services, which explains our results that of the CHCs delivering services for hypertension, 68% report services in the screening of patients and 61% report treatment services. For mental illness (schizophrenia and epilepsy), this number is much higher with 81% offering screening services, and 92% delivering treatment.

As alluded to above, the lack of treatment and specifically medications is another barrier to the availability of NCD services at the CHCs. Of all our CHCs surveyed, 3% had medications for diabetes, 31% had medications for hypertension, and 9% had medications for chronic lung diseases, despite the fact that first line treatments for these diseases recommended by the WHO in their package of essential medications for NCDs (WHO, 2010), and are listed in the essential medications list for Vietnam for the CHC level. An explanation for the lack of medications can be that unlike the previous NTP

programs such as TB, malaria, and mental illness that provides medications free of charge through the CHCs, the program scope for the diabetes, hypertension and chronic lung diseases do not include financing of treatment. Our study reveals that financing for medications come mainly from out-of-pocket expenditures, and at select CHCs, is in combination with health insurance. Health insurance has little influence on out-of-pocket spending at CHCs because the CHCs have not yet been fully integrated into the existing public health facility network with contracts with the Vietnam health insurance agency, as CHCs are not recognized as institutional entities (Sepehri, 2011; World Bank, 2007). Because health insurance reimbursement mechanisms are not fully integrated into the CHCs, patients may opt to go to the district level or higher, or to clinics where their health insurance is accepted. On the other side, because CHCs cannot be reimbursed for services, there may be no incentive for them to provide the services.

The lack of integration of health insurance into the CHCs may also explain the low volumes of patient visits to CHC. CHCs in our study average only about 15 patient visits per day, for all causes. These low numbers of CHC visits are comparable with other studies (Philips, 2006, unpublished; Fritzen, 2007; Ngo, 2011). This study is the first to document CHC visits for the five major NCD disease categories, which only makes up 15% of the total of overall visits. The low number of CHC visits for NCDs recorded in this study greatly contrast with the burden of NCDs, as reported by government, non-governmental and other studies (WHO, 2014; MOH, 2014; Son, 2012; Minh 2014). One explanation for this may be the perceived severity of illness of NCDs, which is usually asymptomatic until the later stages, and then often require higher levels of medical attention (Kenge, 2014). This could be explained by a multitude of reasons including preferences among the population to seek out traditional healers, the ease and availability of private pharmacies that patients can directly go to buy medications, perception that CHCs deliver lower quality care and if one were to go to a health facility, it would be better to go directly to a higher level such as the district for provincial levels since more services are available there (Philips, 2006, unpublished). A better understanding of patient's impressions of care delivery at CHCs will need to be examined by future research to increase CHC utilization.

Prevention Activities

Chronic diseases share common preventative risk factors. This research examined the four modifiable risk factors as identified by WHO that contribute to the morbidity and mortality of NCDs. These risk factors: tobacco consumption, alcohol consumption, physical inactivity and unhealthy diets, all have both population and individual aspects which can be identified by strategies for national governments and clinicians at CHCs.

Tobacco Control

Data from the 2010 Global Adult Tobacco Survey (GATS) shows that nationally, 47.4% of men, 1.4% of women, and 23.8% overall (15.3 million adults) smoke tobacco. Of those current smokers, 81.8% smoked on a daily basis. 83.7% smoked cigarettes, and 26.9% smoked water pipes. The National Nutrition Survey in 2010 breaks down tobacco usage of the overall adult population by the provinces that we focused on in our study. Hai Phong (Red River Delta) and Bac Giang (northern midlands) fall below the national average of 23.8% at 16% and 20% respectively, while Dien Bien (northern mountains) is above the national average at 25%.

Despite the high rate of tobacco usage among the Vietnamese population, and in particular men, results from this study indicate only 25% of CHCs report conducting tobacco prevention activities. The mountainous region, with the highest rate of tobacco usage, also reports the lowest rate of tobacco prevention activities at 5.71%. This is particularly alarming because tobacco use is a leading cause of death in Vietnam (GATS, 2010). A simulation model developed for Vietnam estimated that nearly 40,000 deaths were attributed to smoking in 2008- a figure set to rise above 50,000 deaths annually by 2023 (Levy, 2006). A study by Norman et al. reported that smoking caused between 66,000-76,000 deaths in 2005, accounting for 9.7% to 11.1% of total deaths and 6.8%-7.7% of DALYs lost in Vietnam in 2006. Cardiovascular diseases and chronic obstructive pulmonary disease accounted for the largest proportion of the burden attributed to smoking in males and females (Norman, 2013). Tobacco control policies need to be both at the national level with laws around advertisements, smoke-free zones, taxation, which from our literature review, is being implemented with the passage of the first

comprehensive tobacco control legislation by the National Assembly in 2012, and at the CHC level, which results from our study indicate that tobacco control services are not widely available. Our findings are further supported by evidence from the 2010 GATS survey that found that among smokers who had visited a healthcare provider (HCP) during the previous 12 months, only 34.9% said they were asked about their history of tobacco smoking. Less than one third of smokers (29.7%) received advice from a HCP to quit smoking. Additionally, although our study did not assess the availability of nicotine replacement therapy or medications to help smoking cessation as these therapeutics are not in Vietnam's essential medicines at the CHC, the 2010 GATS found that in the past 12 months, only 24.4% of respondents had used nicotine replacement therapy, patch or chewing gum and 0.4% had used prescription medications (Bupropion or Varenicline) to try and stop smoking. Given the CHC's position in the community, these sites can act as a natural place for patients to come, receive counseling and therapy, and be monitored and supported to help with cessation.

Alcohol Control

Results from our study do not support a robust response to the growing alcohol consumption epidemic in Vietnam at the CHC level, with only 22% of the CHCs surveyed report conducting any type of alcohol prevention activity, mainly consisting of mass media campaigns rather than one-on-one consultation. The 2002 National Health Survey found the 1-week prevalence of alcohol use to be 46% among men and 2% among women (MOH & GSO, 2003). In 2005, a study conducted in seven provinces reported 1-week prevalence of alcohol use to be 64% among men and 1% among women (HSPI, 2006). The results are variable from study-to-study, which may be due to un-standardized definitions of alcohol (commercial versus home brew) and alcohol consumption. From the 2010 National Nutrition Survey, the trend is again seen that Dien Bien (northern mountainous region) has the highest 1-week prevalence of alcohol intake among the three study provinces at 16% for the general adult population.

A study by Giang et al (2013) showed that alcohol consumption and alcohol-related problems are both increasing and among men, are commonplace in Vietnam. Alcohol

related problems include cardiovascular diseases, accident related injuries secondary to alcohol use, and liver cirrhosis, among many others. Additionally, the share of alcohol expenditure in total household expenditure is substantial, especially among poor households (Giang, 2013). Alcohol expenditure among the lowest income group accounted for a larger share of household income, thus increasing their already vulnerable situation (Giang, 2013). This finding is in alignment with regional and international studies that demonstrate income, education, and other household characteristics to be significant determinants of household expenditure on alcohol. For a poor household, a large amount of income used for alcohol means less money available for food, health, and education. Thus, alcohol consumption could be one of the factors that put poor households at high risk of falling into a poverty trap (Yen, 1995; Giang, 2012; WHO, 2011; Wilsnack, 2002).

Our literature review indicates that Vietnam has already some policies, such as excise tax on alcohol products, mandatory business license to do alcohol trade, ban on alcohol sales in specific places, regulation on alcohol advertisement, and ceiling on level of alcohol concentration in blood and breath of drivers, these policies are far from being well implemented (Giang, 2012; Giang, 2013). There is currently no comprehensive alcohol control strategy for Vietnam at either the national or the community level. Our study shows that only 22% of the CHCs surveyed report conducting any type of alcohol prevention activity, and only 47% of CHC staff report receiving any training on alcohol control strategies. Alcohol control is an important public health issue, both at the national and community level, and a strategy that integrates both levels need to be taken into account in the alcohol policy debate.

Inactivity Prevention & Diet Control

The results from our study show that only 20% of CHCs offered services to prevent physical inactivity and 20% offered services to combat unhealthy diets. These two risk factors contribute to higher morbidity from cardiovascular disease, ischemic stroke, metabolic syndrome, cancer, non-insulin dependent diabetes mellitus, chronic lung diseases, and mental health (WHO, 2009).

The need for targeted prevention around physical inactivity and unhealthy diets cannot be greater. Following the social and economic policy reforms of 1986, Vietnam has rapidly modernized, resulting in quick changes in economy and society. From famine to feast in a matter of decades, Vietnam's population has quickly transitioned from bicycles to motorbikes and automobiles, and adopted unhealthy food consumption patterns including processed, ready-to-eat foods, and increased meat and fat consumption (Ha, 2012; Minh, 2014; Son, 2012, Trinh, 2008; Jensen, 2014). This trend is not only unique to Vietnam, but also other emerging economies as well (WHO, 2009).

Our literature review shows that a high proportion of adults were physically inactive, with only 56.2% aged 25–64 years in Ho Chi Minh City achieving the minimum recommendation of doing 30 minutes moderate-intensity physical activity for at least 5 days per week (Trinh, 2008). A study by Ng et al evaluating physical inactivity in two rural sites in Vietnam reported that the prevalence of physical inactivity ranged from 13% to 58. While it is well understood that levels of physical activity generally decline with age, in Vietnam, the reverse seems true, with observed lower levels of physical activity among younger adults than among older adults (Jensen, 2014). Given this trend, and our study's finding, strategies for promoting physical activity at the CHC level is needed.

From our study, 100% of CHCs surveyed reported providing childhood nutrition services. This includes cooking demonstrations for mothers and individual nutrition counseling during antenatal, prenatal and postnatal visits. Mostly all nutrition and diet activities in Vietnam have been focused on preventing childhood malnutrition, as the country, still has a 29.3% prevalence of stunting (height-for-age) in children under-five in 2010. However, Vietnam is suffering a double burden of not only underweight but also overweight and obesity (Cuong, 2007). This requires a focus on both nutrition activities to prevent malnutrition, but also counseling on healthy diet behavior and choices. Since CHCs are already doing nutrition activities to combat child malnutrition, coordination with existing nutrition activities to incorporate messaging around healthy food choices and low fat and low sodium diets would seem feasible. The National Strategy for

Nutrition, 2011-2020, with a vision towards 2030 does address unhealthy diet and obesity, with a focus on the community level by having a goal that by 2015, 100% of communal nutrition coordinators and nutrition collaborators will be trained and updated on nutrition care practices. However, as of 2014 when this research was conducted, the authors did not note any communal nutrition coordinators present.

Opportunities

Aside from the challenges presented above, there are many key strengths of the current NCD situation both at the policy level and the CHC level that should be harnessed to create a robust NCD response, focused at the CHC level. As noted above, the GOVN should be lauded for being one of the first countries in Asia to create a national strategy for NCD prevention and control in 2002. Subsequently, a series of NTPs and legislation was been created, which focused on specific diseases. One example is with the NMHP, which successfully brought services for schizophrenia and epilepsy to 96% of CHC in this study, with 92% of them reporting providing first line antipsychotic and antiepileptic medications. This study reports a higher percentage of psychiatric medication availability as compared to another study that found that 51-80% of primary health care facilities have at least one psychotropic medicine of each therapeutic category (Niemi, 2010). This may be explained by the fact that the Niemi et al study was conducted in 2009, and by the time our study commenced, a higher number of CHCs had the NMHP. Although the NTP approach for schizophrenia and epilepsy has led to high service availability at the CHC level, as discussed above, this approach is not ideal for other NCDs. However, this example shows of how a high level of commitment for community level services with one particular NCD can result in service availability at the CHC level. This same commitment from the highest levels of government should be sustained and harnessed as Vietnam creates its national targets and strategies for NCD prevention and control in 2015.

Vietnam's impressive network of over 11,400 CHCs across the country serve as the front line for entry into the country's health system, and is a major strength in the health system. This research shows that these CHCs have high capacity in delivering prevention,

care and treatment services, as evident by over 90% reporting services in maternal and child health services, 92% offering safe child births by a trained medical personnel and 92% offering diagnosis and treatment of tuberculosis. Vietnam's population health gains (figure 6) provide additional strong evidence to the impact of CHC services. In the current health system, the CHCs serve as an integration of the country's separate prevention and treatment arms (figure 3). The power of this existing and expansive CHC network should be utilized in the delivery of NCD prevention and control (Samb, 2010). Interventions for NCDs at the primary care level are proven to be cost-effective (Ortegon, 2012), and are shown to reduce morbidity, mortality and the need for higher cost interventions in the later stages of the disease course (Allotey, 2010; Maher, 2009).

The high number of CHCs reporting the availability of NCD equipment is another strength. 95% of CHCs report having equipment for testing and diagnosing diabetes, 96% for hypertension, and 76% of chronic lung diseases. The low number for chronic lung disease equipment availability may be a result of the late addition of the NCRDP in 2011 as compared to 2002 for diabetes and hypertension. In comparison to the only published study on NCD service availability at CHCs by Minh et al (2014), the results from this study report similar availability of hypertension equipment, but higher availability of diabetes and chronic lung disease equipment than the Minh et al study. This may be explained by the length of time between the data collection period of the Minh et al study in 2011 as compared to 2014 in this study. It will be crucial for the GOVN to grasp the current availability of equipment for NCD diagnosis and treatment at CHCs to inform policies regarding how to invest appropriate resources. The WHO has come up with a list of essential NCD equipment necessary for delivery of NCD services in resource poor settings (WHO-PEN, 2010) that the GOVN can align with.

In addition to the high availability of NCD equipment found in this study, the availability of materials such as telephone, computer, Internet, electricity and clean water are reported at over 90% of CHCs, with no statistical difference between the three study regions. This likely can be explained by the 2011 MOH Benchmark Standard, which stipulate that all CHCs, in order to meet national standards, have to have all of the

infrastructural components assessed in this study. This is an extreme asset to the GOVN as basic CHC infrastructure already exists to deliver health care services. Specifically, computer and Internet is available at 98% and 95% of CHCs in this study, which will be extremely useful as the GOVN develops a national health information and reporting system, and will also help in tracking the status of national NCD targets at the CHC level in the future.

The availability of human resources is also another strength of the CHCs found in this study. Our study found that 62% of CHCs reported having a physician as the most highly trained staff, with the remaining 38% having a physician assistant. Each CHC also had between two and three additional staff (nurses, midwives, pharmacist, traditional medicine specialist) and an average of 7 VHW. The staffing of a CHC is also stipulated in the 2011 MOH Benchmark standards, and from our results, the majority of the CHCs in our survey met these standards. This study did not assess the roles and responsibilities of CHC staff in regards to NCD service delivery. Our review of the literature and policy documents did reveal any defined roles and responsibilities for the different types of CHC staff with regards to NCDs services. As the GOVN develops national strategies to control the NCD epidemic, experience from high income countries has demonstrated that creating high-functioning primary care team is essential to delivering safe, high-quality care (Gawande, 2011; Grumbach, 2004). For example, one meta-analysis of different quality improvement interventions in front-lines health centers to improve glycemic control in type 2 diabetes found that of all different strategies, those that involved a change in team structure or function led to the best outcomes (Shojania et al., 2006). Experience in other LMICs have demonstrated the positive benefits of task-shifting and strategies that allow for non-physician personnel to manage NCDs (Peck, 2014; Anthos, 2007; Kenge, 2009). Given that CHCs are already well staffed according to MOH Benchmark standards, as demonstrated in this study, the GOVN should develop strategies that incorporate the concept of health care “teams” and task-shifting to help meet the national NCD targets.

As described in the above section, there are many strengths in the current health system that can be harnessed towards the prevention and control of NCDs at the CHC level. At the policy level, the national government has shown political commitment towards the fight against NCDs. The experience of the expansive network of CHCs across the country in delivering services prevention and treatment services in maternal and child health, immunizations, safe deliveries is another strength. And finally, the current general capacity of the CHCs themselves, with existing equipment, infrastructure and human resources all create strong foundation for the incorporation of NCD prevention and control services into the existing network.

Conclusion

This is the first multi-site study on NCD service availability around prevention, screening, and treatment at the CHC level in Vietnam, including the first study to examine these NCD services in a mountainous region that consists of ethnic minorities. It is also the first study to examine how the current political and legal framework can explain NCD service availability at the CHC level. As Vietnam prepares to define national targets for NCD prevention and control in 2015, in compliance with the 2011 UN Political Declaration on NCDs, research like this one can offer a glimpse of the current situation of NCD service availability at the CHC level, and will be valuable to the MOH and GOVN.

The results from this study demonstrate that overall, NCD prevention and control services for diabetes, hypertension, chronic lung diseases and cancer are not readily available at the CHC level. At CHCs where services are available, they consist mostly of screening and early detection. However, services for mental illness around schizophrenia and epilepsy are widely available at the CHC level for both screening and treatment. Numerous factors contribute to this picture.

At the national level, the staggered and haphazard implementation of the National Strategy for NCD Prevention and Control as a series of disease specific NTPs that had minimal integration with each other was a missed opportunity to deliver quality NCD services. Additionally, the lack of prevention efforts among the four common NCD risk factors integrated into the NTPs contributed to the low number of CHCs reporting the availability of prevention services.

At the CHC level, factors include the lack of first line medications at the majority of CHCs as recommended by the WHO list of essential medicines and supplies for NCD services. Another factor is the lack of integration with health insurance for the CHC and the patients may contribute to the low amounts of service availability. Finally, the low utilization of CHC services, measured by number of CHC visits for all disease categories and for NCD specific causes, may be another reason for low service availability. This final factor greatly contrasts with the high burden of NCDs on morbidity and mortality in Vietnam.

This study also showed a statistically significance difference in terms of NCD service availability between the three studied geographical regions in northern Vietnam, with the northern mountainous region having the overall the lowest service availability. The northern mountainous region is also the poorest region among the three, as measured by GDP, has the lowest literacy rate and the least number of health professionals and medical facilities. The region also had the highest prevalence of tobacco and alcohol consumption. This region has a higher prevalence of infant mortality, child malnutrition, and maternal mortality. This information underscores that like the global NCD epidemic where it is the LMICs that are disproportionately affected, within a country, the poorer regions are also disproportionately affected with lower service availability for NCD services along with other competing health priorities, as compared to other regions. Therefore, strong investments in regions like the northern mountainous ones should be of utmost importance in order to strengthen the existing health infrastructure to deal with this double burden of disease.

However, this study did uncover many strengths and opportunities that the GOVN can capitalize on to build a robust response to the NCD epidemic. At the policy level, the national government has shown and should continue to show a strong political commitment towards the fight against NCDs. The existing staffing, infrastructure and availability of NCD equipment in the expansive network of CHCs across the country are valuable resources in efforts to curbing the growing NCD epidemic.

This year, Vietnam is in the process of developing national targets for NCD prevention and control, and the strategies to reach those targets. It is important that national strategies support integration of NCD prevention and control efforts at the CHC level, and in turn, also support the strengthening of the CHCs as a whole. More research focusing on both the capacity and interventions at the CHC is needed to develop appropriate, sustainable and achievable strategies to meet national NCD targets. This research describes many challenges that the current health system faces, but also presents strengths that the GOVN can capitalize on to strengthen the CHC system in order to provide quality care for the Vietnamese population.

Limitations

This study has several limitations. First and foremost, this study is descriptive, hypothesis driven, therefore, the p-values should be considered as exploratory rather than true hypothesis testing. The study consisted of a critical and systematic review of the published literature as well as the gray literature and government documents. The gathering of gray literature and government documents utilized a “snowball” technique that may have missed documents. For the facility assessment, the study utilized the WHO SARA tool that has been validated, however, the tool was modified for the Vietnam context, and the final tool was not validated. In addition, the study only focused on three geographical regions in northern Vietnam, therefore, the results cannot be generalizable to the rest of Vietnam or the big urban populations of Hanoi and Ho Chi Minh City. The study also relied predominately on self-reported filled in questionnaires, and it is likely that we have errors in our data. The source of errors consists of systematic and random errors.

List of Tables and Figures

Table 1. Overview of Sampled Provinces

	Red River Delta (Hai Phong)	Northern Midlands (Bac Giang)	Northern Mountains (Dien Bien)
GDP (VND/person/year) (Millions) (a)	38.2	23	17
Area (km²) (a)	1527.4	3849.7	9562.9
Population (1000) (a)	1925.2	1593.2	527.3
Literacy Rate (a)	98.5	97.7	71.4
<i>Health Staffing (Total Number)</i>			
Physicians (a)	1471	1115	426
Physician Assistant (a)	750	1469	1105
Nurses (a)	2711	1515	583
Midwife (a)	580	315	254
Pharmacist (a)	382	459	271
<i>Public Medical Centers</i>			
Hospitals (Provincial, District) (a)	24	16	14
Medical Service Units (including CHCs) (a)	224	230	112
<i>Risk Factors</i>			
BMI (b)	20.86	20.44	21.23
Tobacco (% current smokers) (b)	16%	20%	25%
Alcohol Intake (% 1-4 days/wk) (b)	7%	11%	16%

Source: (a) General Statistics Office, 2012;

(b) National Institute of Nutrition Survey, 2010

Table 2. CHC Infrastructure

	Average (N=89)	Red River Delta (Hai Phong) (N=20)	Northern Midlands (Bac Giang) (N=37)	Northern Mountains (Dien Bien) (N=32)
Telephone (Landline)	86%	80%	100%	77%
Computer	98%	95%	100%	100%
Internet	95%	85%	100%	97%
Reliable Electricity*	95%	95%	90%	94%
Clean Water Source	98%	100%	100%	97%
Private Examination & Consultation Room	39%	30%	40%	37%

*No power outage in the past 7 days

Table 3. General Services Offered

	Average (N=89)	Red River Delta (Hai Phong) (N=20)	Northern Midlands (Bac Giang) (N=37)	Northern Mountains (Dien Bien) (N=32)
<i>Maternal & Child Health</i>				
Family planning services	94%	100%	100%	86%
Antenatal Care (ANC) services	91%	100%	100%	78%
Child Immunization Services	100%	100%	100%	100%
Preventative and Curative Care Services for Children Under 5	98%	95%	100%	100%
Child nutrition services	100%	100%	100%	100%
Adolescent Health Services	80%	89%	86%	70%
<i>Communicable Diseases</i>				
HIV counseling	86%	95%	96%	72%
Diagnosis or treatment of STIs, excluding HIV	65%	65%	79%	54%
Diagnosis and treatment of tuberculosis	95%	90%	96%	97%
<i>Procedures</i>				
Minor procedures (suturing, wound debridement/closure, tooth extraction), including early abortive services.	50%	40%	62%	44%
Normal Delivery and Newborn Care Services	92%	94%	100%	83%
<i>Diagnostics & Commodities</i>				
HIV testing services	27%	45%	36%	11%
Laboratory diagnostics, including any rapid diagnostic testing	42%	47%	57%	27%
Storage of medicines, vaccines, or contraceptive commodities	97%	100%	100%	94%

Table 4. NCD Services Available

	Average (N=89)	Red River Delta (Hai Phong) (N=20)	Northern Midlands (Bac Giang) (N=37)	Northern Mountains (Dien Bien) (N=32)	P-Value
Diabetes	53%	85%	68%	22%	0.000
Hypertension	64%	90%	78%	38%	0.000
Chronic Lung Diseases	39%	35%	80%	6%	0.000
Cancer	22%	35%	28%	11%	0.082
Mental Illness	96%	95%	96%	97%	0.903

Table 5. NCD Presentation Services

	Average (N=89)	Red River Delta (Hai Phong) (N=20)	Northern Midlands (Bac Giang) (N=37)	Northern Mountains (Dien Bien) (N=32)	P-Value
Alcohol Consumption	22%	10%	34%	17%	0.092
Inactivity	20%	21%	37%	6%	0.006
Healthy Diet	20%	21%	34%	8%	0.035
Tobacco Control	25%	5%	59%	5%	0.000

Table 6. Patient Volume Over the Past Month

	Average (N=89)	Red River Delta (Hai Phong) (N=20)	Northern Midlands (Bac Giang) (N=37)	Northern Mountains (Dien Bien) (N=32)	P-Value
<i>Outpatient Visits (All Causes)</i>					
Last Month	223.53	317.26	233.86	166.64	0.000
Yesterday	15.11	23.36	18.24	8.25	0.000
<i>Outpatient Visits Last Month (By NCD)</i>					
Diabetes	1.46	1.25	2.16	0.94	0.004
Hypertension	10.7	13.4	12.5	7.82	0.185
Chronic Lung Diseases	2.98	0.31	8.38	1.77	0.000
Cancer	0.51	0.18	1.12	0.11	0.000
Mental Illness	15.18	2.27	12.61	23.14	0.000

Table 7. Select Health Indicators for Dien Bien vs Nationwide

	Infant Mortality Rate (per 1,000 live births)	Under-5 Moderate malnutrition (%)	Maternal Mortality (Rate per 100,000 births)	Malaria (cases per 100,000 people)
Dien Bien	36 (a)	50 (a)	84 (a)	450 (a)
Nationwide	15 (c)	27 (b)	75 (b)	70 (c)

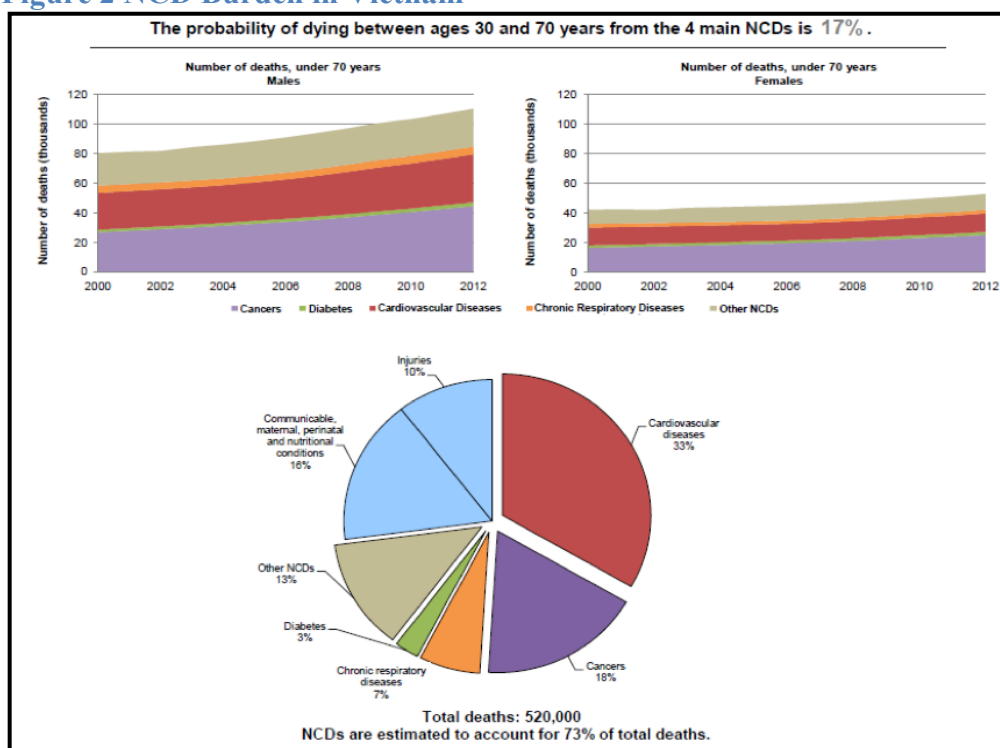
Source: (a) Dien Bien Department of Health, 2013, (b) UNICEF/Vietnam, 2013, (c) MOH, 2013

Figure 1. Nine Voluntary Targets



Source: WHO NCD Global Monitoring Framework, 2012

Figure 2 NCD Burden in Vietnam



Source: WHO NCD Country Profile: Vietnam, 2011

Figure 3. Organization of Vietnamese Health System

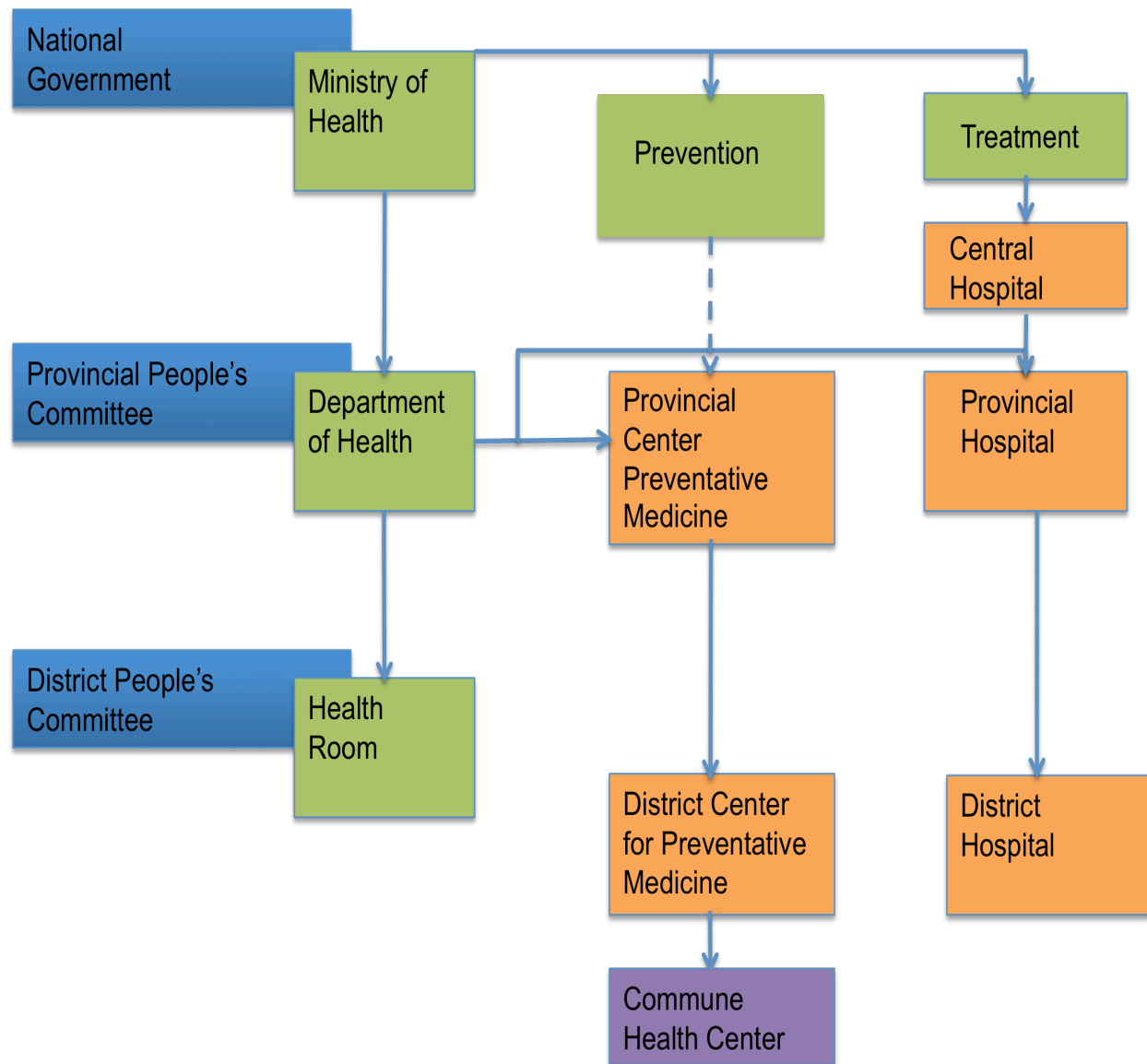


Figure 4. Percentage of CHCs reporting services around screening and Treatment (Diabetes, Hypertension, Cancer, Chronic Lung Diseases (starting at top left graph, clockwise))

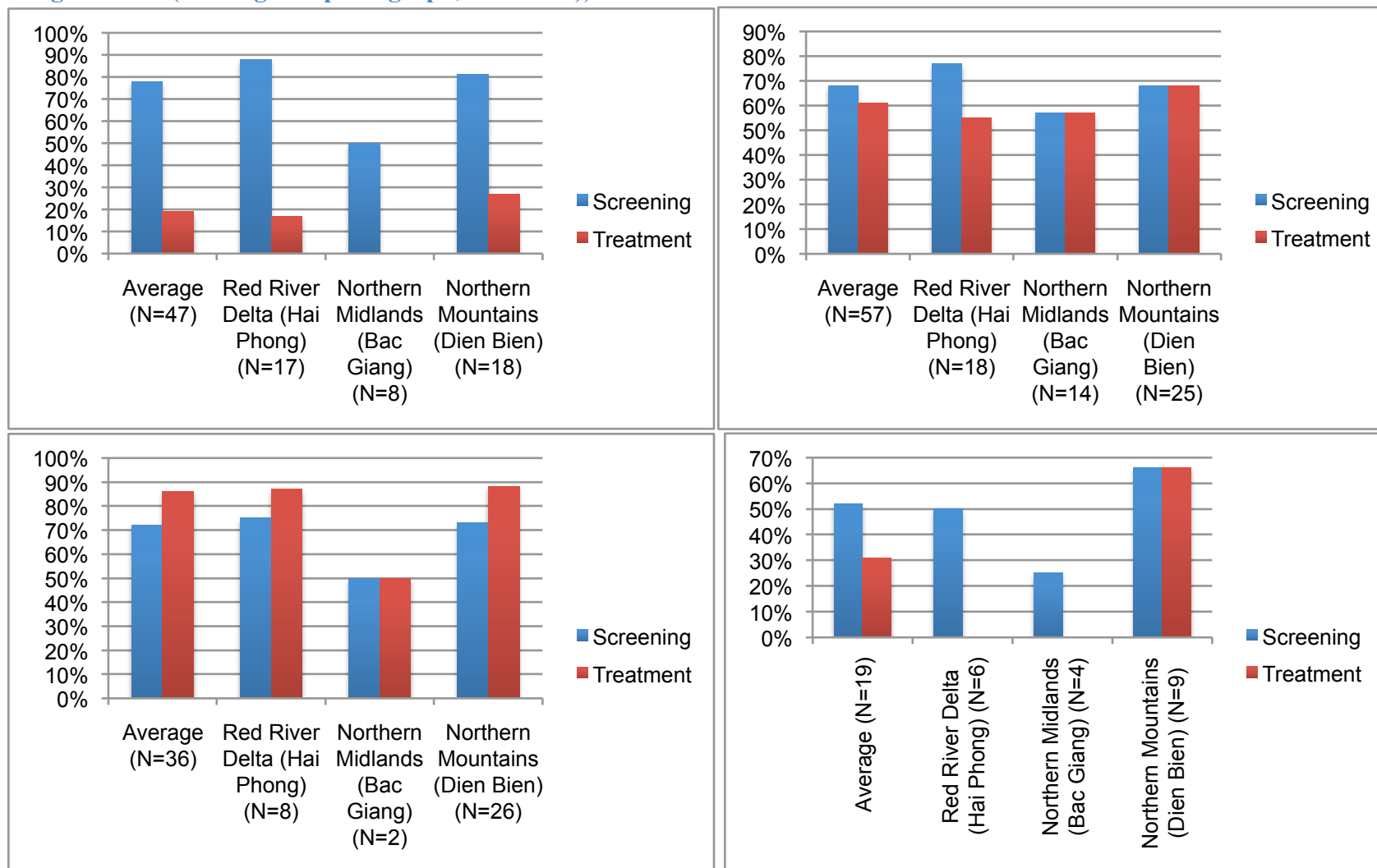


Figure 5. Availability of Medication and Equipment

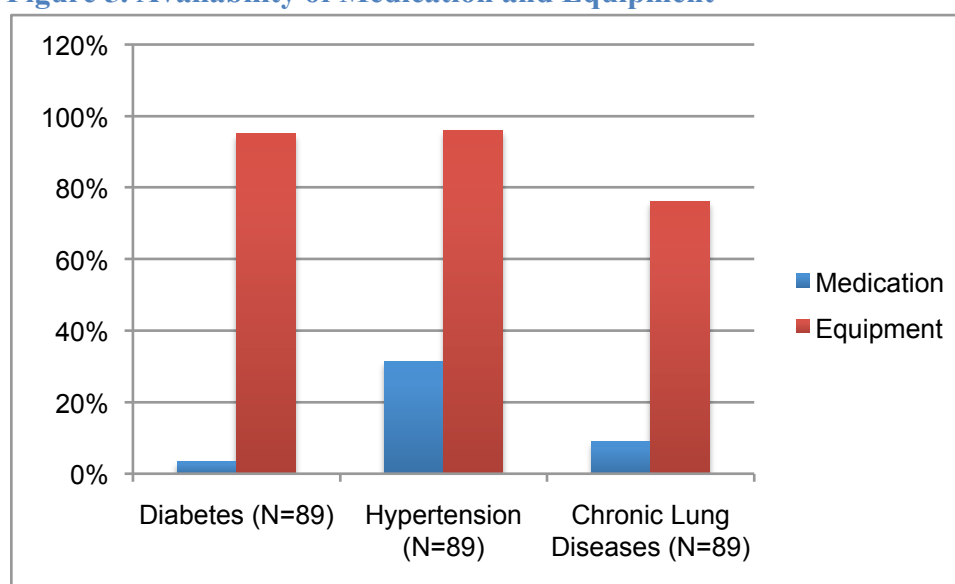


Figure 6. Population Health Achievements

Reached MDG 4: Reducing Child Mortality (19.61/1000 live births) (a)
Reached MDG 5: Reducing Maternal Mortality (59/100,000 births) (b)
Over 90% Childhood Vaccination Rate in WHO Program for Pediatric Vaccinations (a)
Life Expectancy at 76 years old (b)

Source: (a) UNICEF, 2012; (b) WHO, 2012

Acknowledgements

This research study and thesis would not have been possible with the out help and support from the following individuals and organizations:

First and foremost, to my research mentor Dr. Andrew Ellner, thank you for your dedication and undying support for my vision in conducting this research study and your constant mentorship, whether in Boston or in Hanoi. This report could not have been possible without you.

Thank you to Dr. Hoang Van Minh, my in-country mentor, who has put countless hours in assisting with the logistics of this study, the research design and the feedback on data.

Thank you to Le Trang and Luu Minh, the two wonderful research assistants, who helped in the survey design, data collection and logistics.

Thank you to Dr. Long Ngo, my amazing and extremely patient biostatistician. Thank you for putting up with my never-ending questions and always being available to meet and work with me from the beginning with the study design, to data analysis and finally to interpretation of the study.

Thank you to Ms. Julia Whelan for help with literature reviews, finding resources and sending me references and books all the way to Vietnam, and Dr. Todd Pollack, who was a constant source of support and friendship during my time in Vietnam.

And a special thank you to all of the commune health center staff, district health center staff, and provincial department of health staff who so warmly welcomed the research team into your provinces, health facilities and homes. With out you, this report would not be possible.

Finally, I dedicate this thesis to my family, and specifically my grandparents, who have been the inspiration for my desire to return to Vietnam, to learn more about my heritage and culture, and to discover the land, food and people that make up so much of who I am.

This study was made possible by the generous financial support of the US State Department Fulbright Research Fellowship, the Harvard Medical School Center for Primary Care and the Scholars in Medicine Office at Harvard Medical School.

This study is conducted under the collaboration framework between Harvard Medical School Center for Primary Care, Hanoi Medical University, HMU Center for Health Systems Research, and the WHO/Vietnam NCD Division.

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Annex I

Detailed MeSH Search Strategy

First Search:

non communicable[tw] OR noncommunicable[tw] OR "Chronic Disease"[Mesh] OR chronic condition*[tw] OR chronic disease*[tw] OR chronic illness*[tw]) AND (Vietnam[tw] OR Vietnamese[tw])

Second Search:

(non communicable[tw] OR noncommunicable[tw] OR "Chronic Disease"[Mesh] OR (chronic condition[tw] OR chronic conditioning[tw] OR chronic conditions[tw]) OR (chronic disease[tw] OR chronic diseases[tw]) OR (chronic illness[tw] OR chronic illnesses[tw]) OR ("heart diseases"[tw] OR diabetes[tw] OR stroke[tw] OR "cerebrovascular accident"[tw] OR cancer[tw] OR neoplasm[tw] OR neoplasms[tw] OR "cardiovascular diseases"[tw] OR "chronic respiratory diseases"[tw] OR COPD[tw] OR "lung diseases"[tw] OR "chronic obstructive pulmonary disease"[tw] OR "mental health"[tw] OR Hypertension[tw] OR "high blood pressure"[tw] OR hypertensions[tw] OR "tobacco use"[tw] OR smoking[tw] OR alcoholism[tw] OR "alcohol abuse"[tw] OR overweight[tw] OR obesity[tw])) AND (Vietnam[tw] OR Vietnamese[tw]) AND English[lang]

Third Search:

Search (((non communicable[tw] OR noncommunicable[tw] OR "Chronic Disease"[Mesh] OR (chronic condition[tw] OR chronic conditioning[tw] OR chronic conditions[tw]) OR (chronic disease[tw] OR chronic diseases[tw]) OR (chronic illness[tw] OR chronic illnesses[tw]) OR ("heart diseases"[tw] OR diabetes[tw] OR stroke[tw] OR "cerebrovascular accident"[tw] OR cancer[tw] OR neoplasm[tw] OR neoplasms[tw] OR "cardiovascular diseases"[tw] OR "chronic respiratory diseases"[tw] OR COPD[tw] OR "lung diseases"[tw] OR "chronic obstructive pulmonary disease"[tw] OR "mental health"[tw] OR Hypertension[tw] OR "high blood pressure"[tw] OR hypertensions[tw] OR "tobacco use"[tw] OR smoking[tw] OR alcoholism[tw] OR "alcohol abuse"[tw] OR overweight[tw] OR obesity[tw])) AND (Vietnam[tw] OR Vietnamese[tw]) AND English[lang])) NOT (((non communicable[tw] OR noncommunicable[tw] OR "Chronic Disease"[Mesh] OR chronic condition*[tw] OR chronic disease*[tw] OR chronic illness*[tw]) AND (Vietnam[tw] OR Vietnamese[tw])) AND English[lang]))

Fourth Search:

Vietnam[tw] OR Vietnamese[tw]) AND "epidemiology" [Subheading] NOT veterans[tw] NOT "United States"[tw] NOT "Vietnam/ethnology"[Mesh] NOT American[tw] NOT Americans[tw] NOT immigrant*[tw] AND ("heart diseases"[tw] OR diabetes[tw] OR stroke[tw] OR "cerebrovascular accident"[tw] OR cancer[tw] OR neoplasm[tw] OR neoplasms[tw] OR "cardiovascular diseases"[tw] OR "chronic respiratory diseases"[tw] OR COPD[tw] OR "lung diseases"[tw] OR "chronic obstructive pulmonary disease"[tw] OR "mental health"[tw] OR Hypertension[tw] OR "high blood pressure"[tw] OR hypertensions[tw] OR "tobacco use"[tw] OR smoking[tw] OR alcoholism[tw] OR "alcohol abuse"[tw] OR overweight[tw] OR obesity[tw])

Supplemental Search:

(Vietnam[tw] OR Vietnamese[tw]) NOT veterans[tw] NOT American[tw] NOT Americans[tw] NOT United States[tw] NOT immigrant*[tw] NOT ethnic*[tw] NOT refugee*[tw] NOT Vietnam era[tw] AND ("heart diseases"[tw] OR diabetes[tw] OR stroke[tw] OR "cerebrovascular accident"[tw] OR cancer[tw] OR neoplasm[tw] OR neoplasms[tw] OR "cardiovascular diseases"[tw] OR "chronic respiratory diseases"[tw] OR COPD[tw] OR "lung diseases"[tw] OR "chronic obstructive pulmonary disease"[tw] OR "mental health"[tw] OR Hypertension[tw] OR "high blood pressure"[tw] OR hypertensions[tw] OR "tobacco use"[tw] OR smoking[tw] OR alcoholism[tw] OR "alcohol abuse"[tw] OR overweight[tw] OR obesity[tw]) NOT medline[sb]